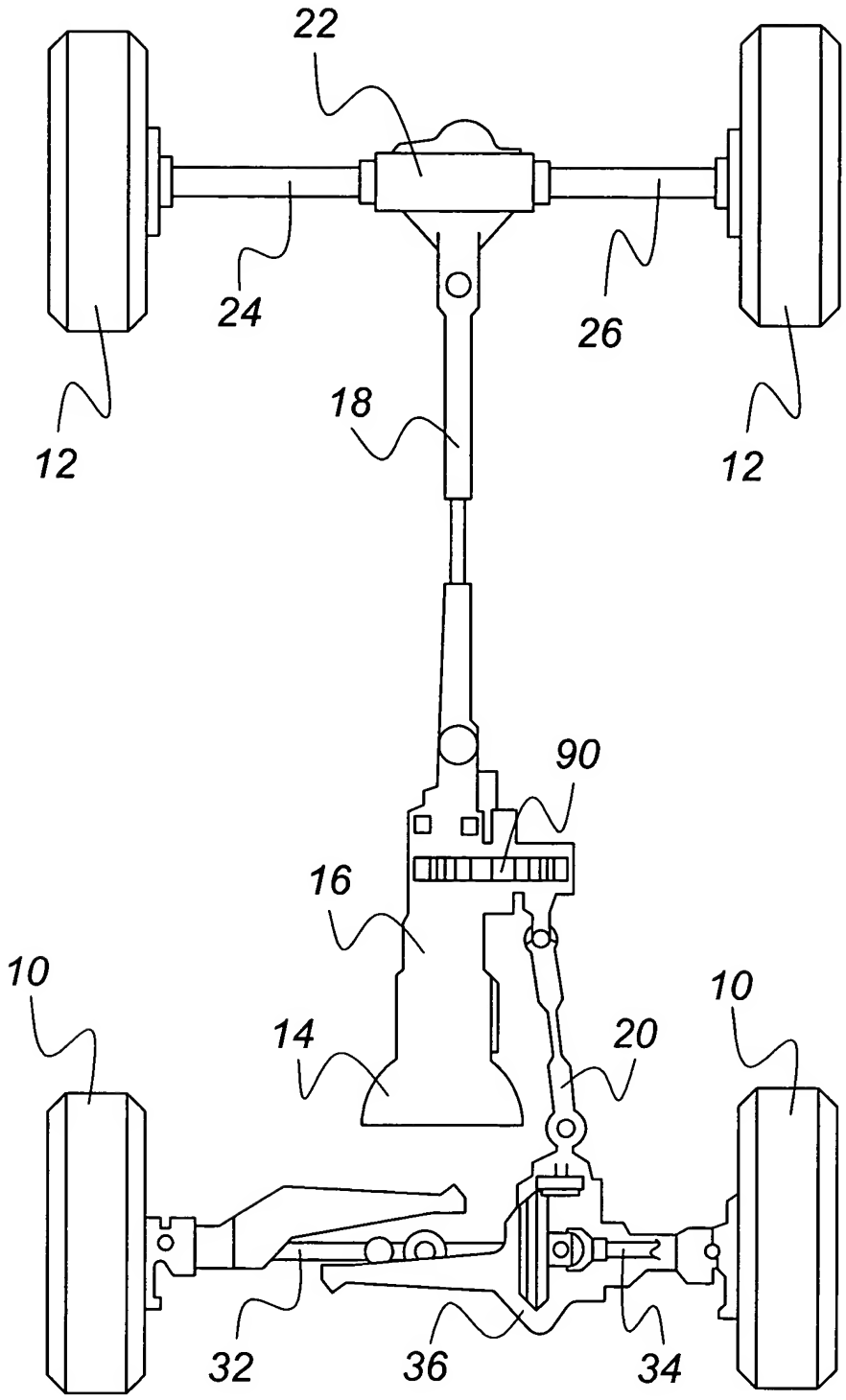


Figure 1

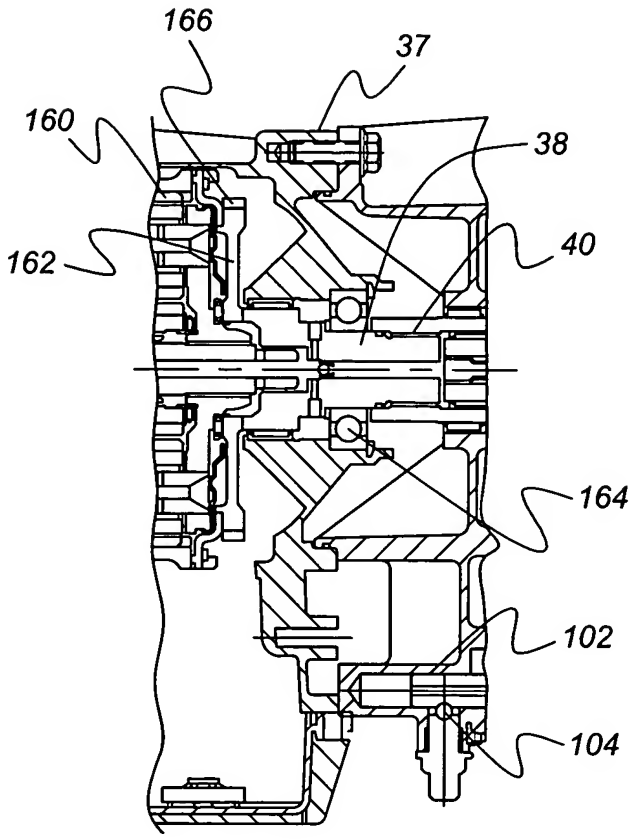


Figure 2A

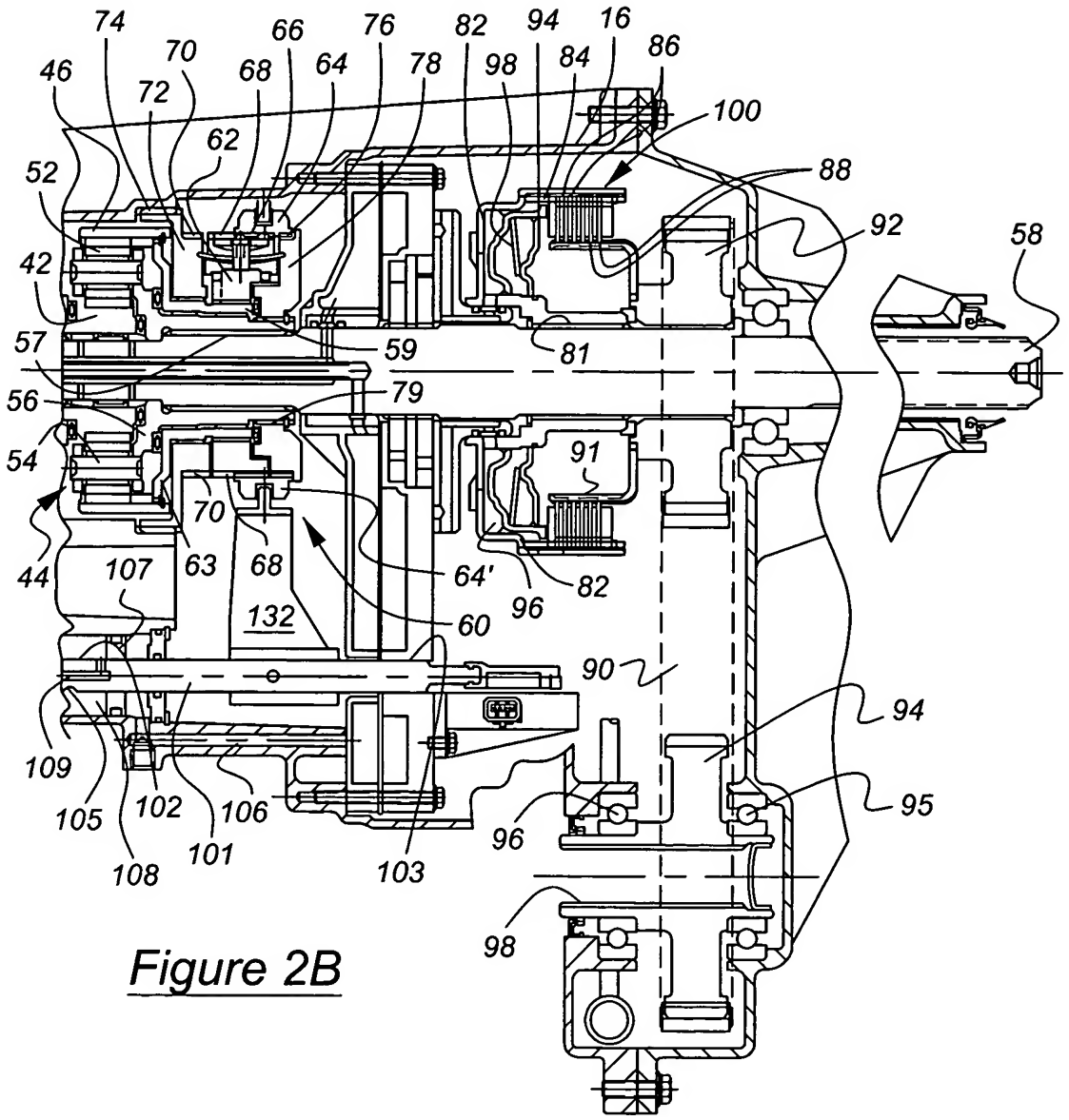

74
66
76
82
94
16
46
70
68
64
78
98
84
86
72
62
100
52
88
92
58
42
57
59
81
56
79
54
91
70
44
107
63
68
64'
82
96
132
60
90
94
109
105
102
106
95
96
108
101
103
98

Figure 2B

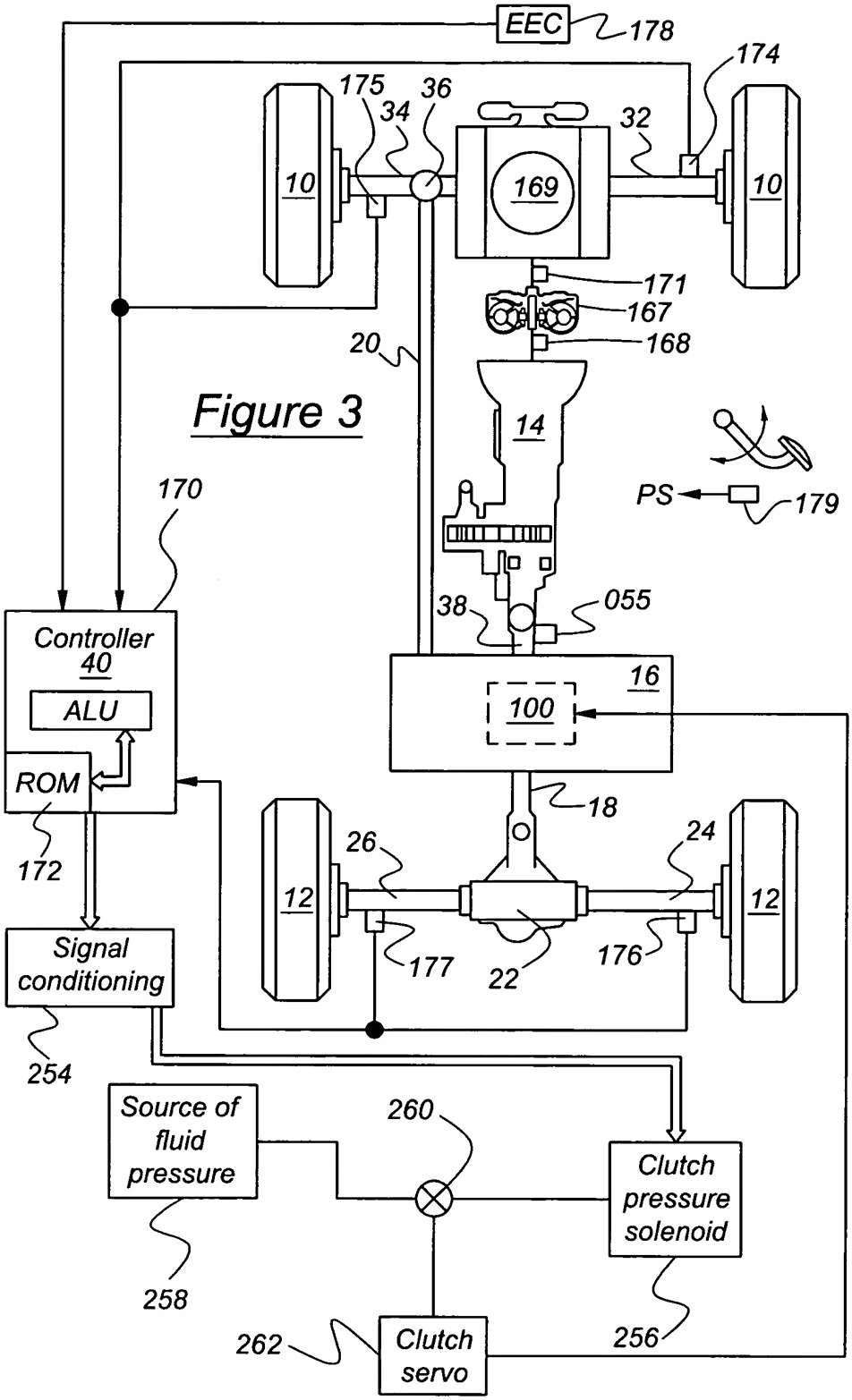
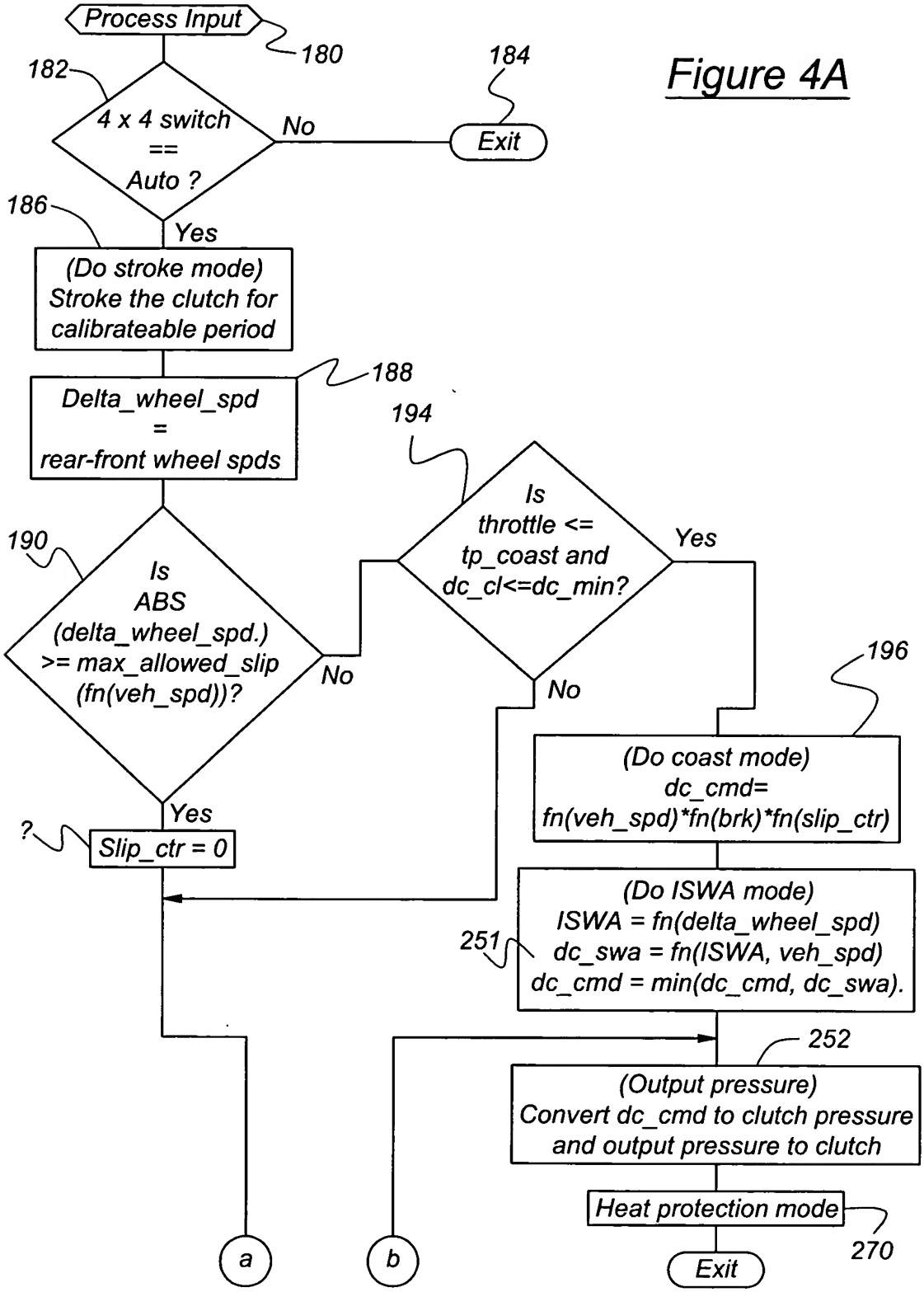

EEC
178
174
175
36
34
32
10
169
10
171
167
168
20
14
PS
179
170
Controller
40
ALU
ROM
172
38
055
16
100
18
26
24
12
12
177
22
176
Signal
conditioning
254
Source of
fluid
pressure
258
260
Clutch
pressure
solenoid
256
262
Clutch
servo

Figure 3

Figure 4A


Process Input
180
182
4 x 4 switch == Auto ?
No
184
Exit
Yes
186
(Do stroke mode) Stroke the clutch for calibrateable period
188
Delta_wheel_spd = rear-front wheel spds
194
Is throttle <= tp_coast and dc_cl<=dc_min?
Yes
No
190
Is ABS (delta_wheel_spd.) >= max_allowed_slip (fn(veh_spd))?
No
Yes
?
Slip_ctr = 0
196
(Do coast mode) dc_cmd= fn(veh_spd)*fn(brk)*fn(slip_ctr)
(Do ISWA mode) ISWA = fn(delta_wheel_spd) dc_swa = fn(ISWA, veh_spd) dc_cmd = min(dc_cmd, dc_swa).
251
252
(Output pressure) Convert dc_cmd to clutch pressure and output pressure to clutch
Heat protection mode
270
Exit
a
b

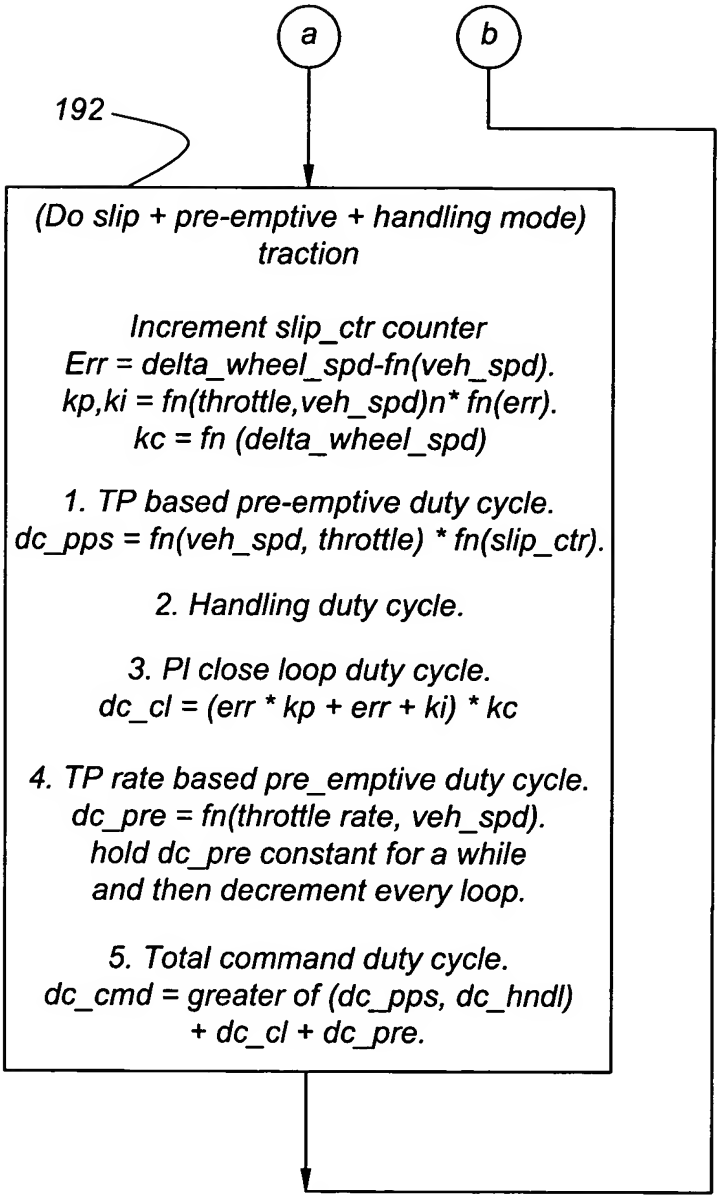

a
b
192
(Do slip + pre-emptive + handling mode) traction
Increment slip_ctr counter
Err = delta_wheel_spd-fn(veh_spd).
kp,ki = fn(throttle,veh_spd)n* fn(err).
kc = fn (delta_wheel_spd)
1. TP based pre-emptive duty cycle.
dc_pps = fn(veh_spd, throttle) * fn(slip_ctr).
2. Handling duty cycle.
3. PI close loop duty cycle.
dc_cl = (err * kp + err + ki) * kc
4. TP rate based pre_emptive duty cycle.
dc_pre = fn(throttle rate, veh_spd).
hold dc_pre constant for a while
and then decrement every loop.
5. Total command duty cycle.
dc_cmd = greater of (dc_pps, dc_hndl)
+ dc_cl + dc_pre.

Figure 4B

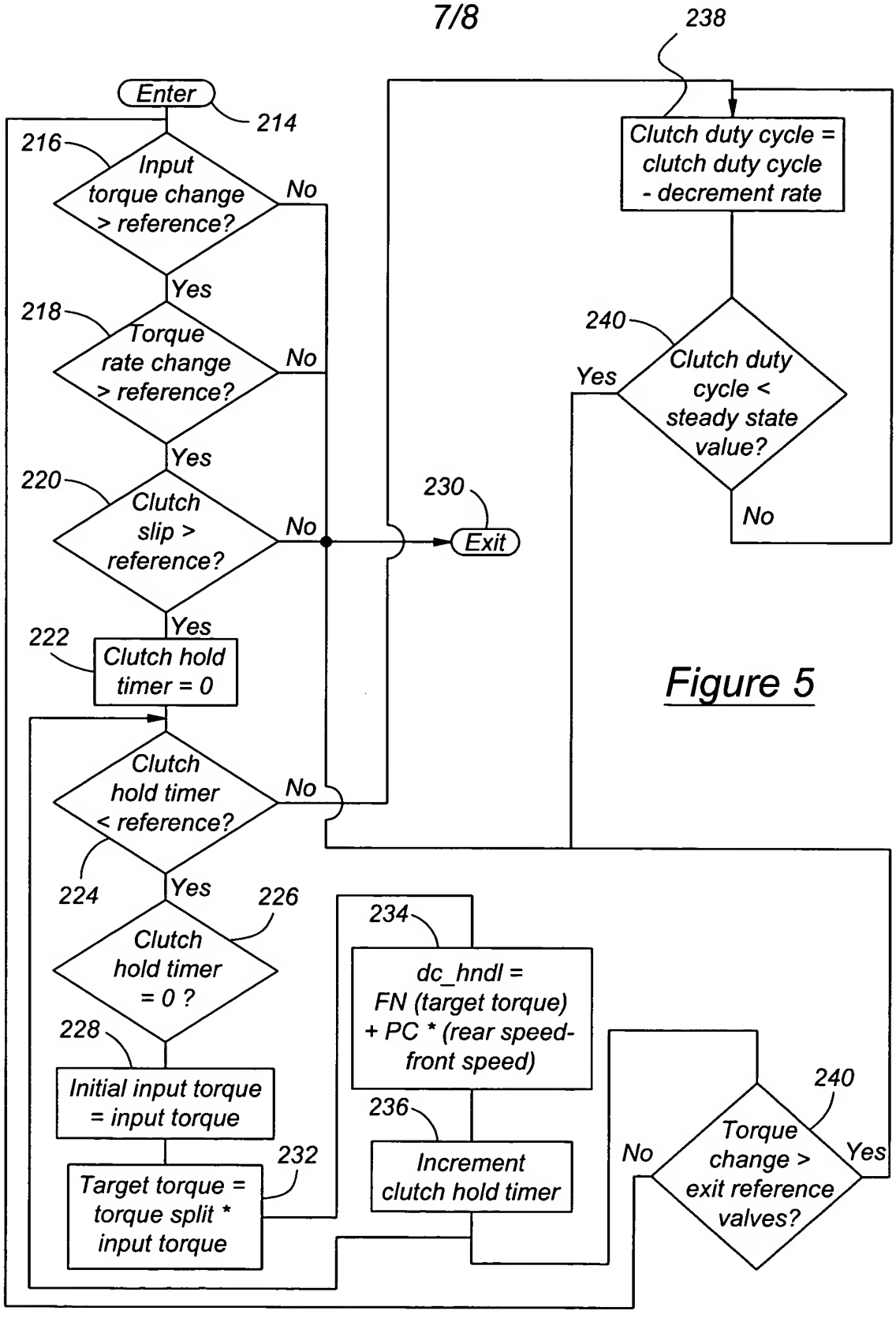
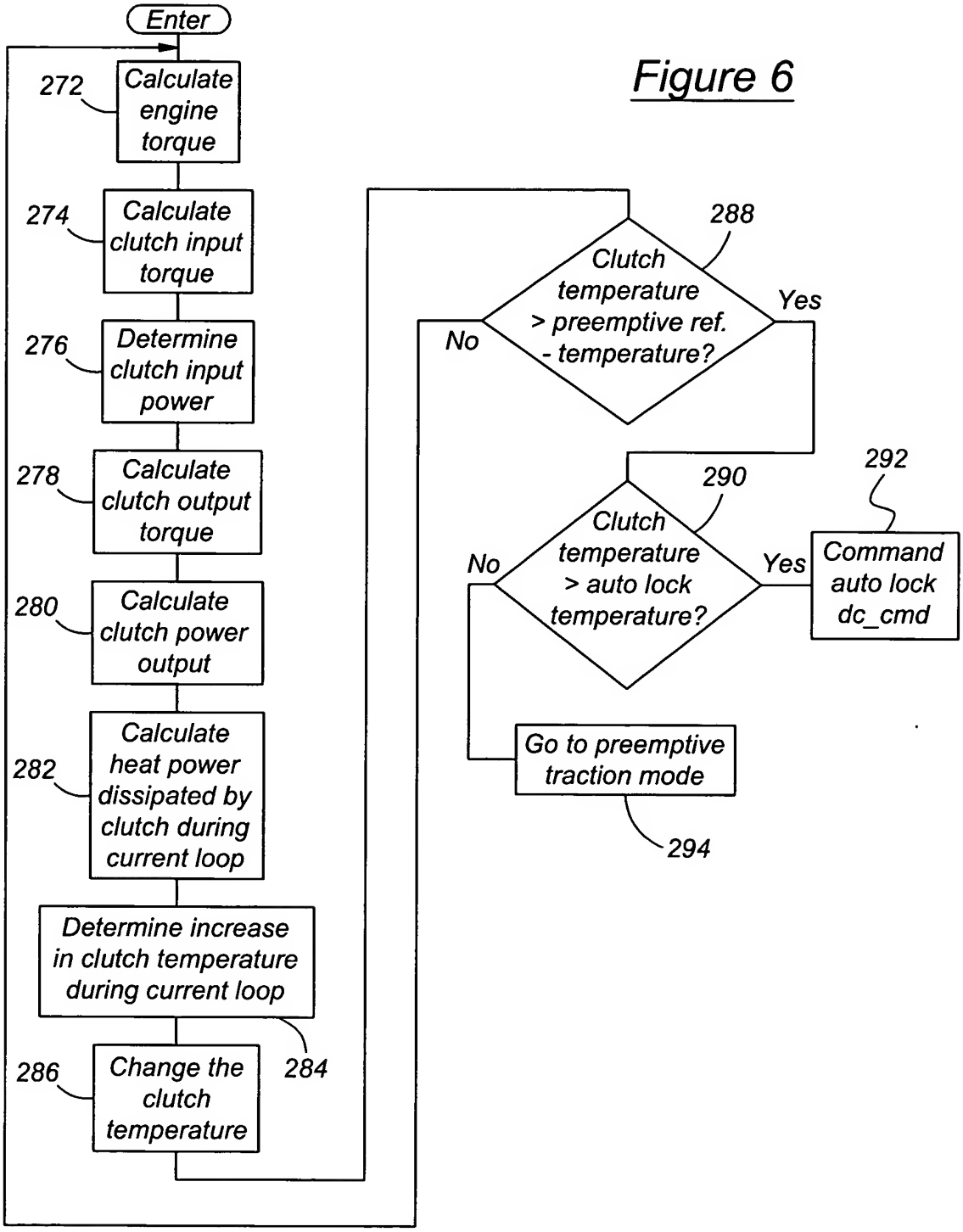

Enter
214
216
Input torque change > reference?
No
Yes
218
Torque rate change > reference?
No
Yes
220
Clutch slip > reference?
No
Yes
222
Clutch hold timer = 0
Clutch hold timer < reference?
No
224
Yes
226
Clutch hold timer = 0 ?
228
Initial input torque = input torque
Target torque = torque split * input torque
232
234
dc_hndl = FN (target torque) + PC * (rear speed-front speed)
236
Increment clutch hold timer
238
Clutch duty cycle = clutch duty cycle - decrement rate
240
Clutch duty cycle < steady state value?
Yes
No
240
Torque change > exit reference valves?
No
Yes
230
Exit

Figure 5

Figure 6


Enter
272
Calculate engine torque
274
Calculate clutch input torque
276
Determine clutch input power
278
Calculate clutch output torque
280
Calculate clutch power output
282
Calculate heat power dissipated by clutch during current loop
Determine increase in clutch temperature during current loop
284
286
Change the clutch temperature
288
Clutch temperature > preemptive ref. - temperature?
No
Yes
290
Clutch temperature > auto lock temperature?
No
Yes
292
Command auto lock dc_cmd
Go to preemptive traction mode
294